AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A distributed Bragg reflector for use in a vertical cavity surface emitting laser, comprising a group of layers of semiconductor material doped to reduce voltage drop and optical loss in a vertical cavity surface emitting laser, ~~wherein in~~ the group of layers ~~there are~~ further including alternating layers of an InP compound approximately lattice-matched with ~~and~~ layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, where "a" and "b" indicate relative proportions of atoms.~~of an antimonide (Sb) compound, at least some of the alternating layers having Sb also including the elements arsenic, aluminum, and gallium.~~

Claim 2 (original): The distributed Bragg reflector of claim 1, wherein the group of layers of semiconductor material are epitaxially grown on a substrate.

Claim 3 (original): The distributed Bragg reflector of claim 2, wherein the substrate includes indium phosphide (InP).

Claim 4 (cancelled)

Claim 5 (currently amended): The distributed Bragg reflector of claim[[4]] 1, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

Claim 6 (currently amended): The distributed Bragg reflector of claim[[4]] 1, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

Claim 7 (currently amended): The distributed Bragg reflector of claim[[4]] 1, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

Claim 8 (currently amended): The distributed Bragg reflector of claim[[4]] 1, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

Claim 9 (original): The distributed Bragg reflector of claim 2, wherein the substrate is n-doped with the element selenium (Se).

Claim 10 (original): The distributed Bragg reflector of claim 1, wherein the group of layers of semiconductor material are configured to form a reflective device.

Claim 11 (original): The distributed Bragg reflector of claim 10, wherein the reflective device is n-doped using tellurium.

Claim 12 (currently amended): A device for reflecting light to an active region in a vertical cavity surface emitting laser, comprising:

a mirror portion including the element antimony (Sb) and an indium phosphide (InP) compound epitaxially grown on a substrate wherein in the mirror portion there are a group of layers, the group of layers further including alternating layers of an InP compound approximately lattice-matched with layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, where "a" and "b" indicate relative proportions of atoms~~said group of layers being alternating layers of the InP compound and layers of the antimonide (Sb) compound~~, and wherein electric current is pumped through the group of layers forming the mirror portion to electrically pump the active region.

Claim 13 (original): The device of claim 12, wherein the substrate includes indium phosphide (InP).

Claim 14 (original): The device of claim 13, wherein the substrate is n-doped with the element selenium (Se).

Claim 15 (original): The device of claim 12, wherein the mirror portion is n-doped to reduce voltage drop and optical loss in a vertical cavity surface emitting laser.

Claim 16 (original): The device of claim 15, wherein the mirror portion is n-doped using tellurium.

Claim 17 (currently amended): A vertical cavity surface emitting laser, comprising:

a pair of mirror portions epitaxially grown on a substrate, the pair of mirror portions including a group of layered stacks of paired semiconductor material, wherein the pair of mirror portions are n-doped to reduce voltage drop and optical loss;

the group of layered stacks in each of the mirror portions further including alternating layers of an InP compound approximately lattice-matched with layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, where "a" and "b" indicate relative proportions of atoms;

~~wherein each of the pair of mirror portions includes at least one of the element antimony (Sb) and the compound indium phosphide (InP);~~

~~wherein in each of the pair of mirror portions there are a group of layers, said group of layers being alternating layers of an InP compound and layers of an antimonide (Sb) compound;~~

an active region epitaxially grown on the substrate and positioned between the pair of mirror portions;

a doped tunnel junction configured to provide electron-hole conversion from one of the pair of mirror portions; and

wherein the pair of mirror portions, the active region, and the tunnel junction are epitaxially grown on the substrate in a single step, and wherein electric current is pumped through the pair of mirror portions to electrically pump the active region.

Claim 18 (original): The vertical cavity surface emitting laser of claim 17, wherein the substrate includes indium phosphide (InP).

Claim 19 (cancelled)

Claim 20 (currently amended): The distributed Bragg reflector of claim 17~~-19~~, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

Claim 21 (currently amended): The distributed Bragg reflector of claim 17~~-19~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

Claim 22 (currently amended): The distributed Bragg reflector of claim 17~~-19~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

Claim 23 (currently amended): The distributed Bragg reflector of claim 17~~-19~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

Claim 24 (original): The vertical cavity surface emitting laser of claim 17, wherein the substrate is n-doped with the element selenium (Se).

Claim 25 (original): The vertical cavity surface emitting laser of claim 17, wherein the doped tunnel junction is n-doped with silicon (Si).

Claim 26 (original): The vertical cavity surface emitting laser of claim 17, wherein the doped tunnel junction is p-doped with CBr4.

Claim 27 (original): The vertical cavity surface emitting laser of claim 17, wherein the pair of mirror portions include a first mirror portion positioned on a top of the active region and a second mirror portion positioned below the active region.

Claim 28 (original): The vertical cavity surface emitting laser of claim 27, wherein the first and second mirror portions are n-doped using tellurium.

Claim 29 (original): The vertical cavity surface emitting laser of claim 17, wherein the active region is grown to include a cavity having five strain compensated quantum wells, the quantum wells including the elements aluminum, indium, gallium, and arsenic.

Claim 30 (original): The vertical cavity surface emitting laser of claim 17, wherein the VCSEL operates in the approximate range from between 1.3 microns and 1.6 microns.

Claim 31 (currently amended): A vertical cavity surface emitting laser comprising:

a substrate on which a pair of mirror portions, an active region, and a tunnel junction are epitaxially grown in a single step in which semiconductor elements are deposited to form a multi-layered structure;

~~wherein in each of the pair of mirror portions there are a group of layers, said group of layers being alternating layers of an InP compound and layers of an antimonide (Sb) compound;~~

the multi-layered structure in each of the mirror portions further including alternating layers of an InP compound approximately lattice-matched to layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, where "a" and "b" indicate relative proportions of atoms; and

at least one metal contact disposed on the substrate, wherein electric current is pumped through the pair of mirror portions to electrically pump the active region.

Claim 32 (original): The vertical cavity surface emitting laser of claim 21, wherein the substrate includes indium phosphide (InP).

Claim 33 (cancelled)

Claim 34 (currently amended): The distributed Bragg reflector of claim 31~~-33~~, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

Claim 35 (currently amended): The distributed Bragg reflector of claim 31~~-33~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

Claim 36 (currently amended): The distributed Bragg reflector of claim 31~~-33~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

Claim 37 (currently amended): The distributed Bragg reflector of claim 31~~-33~~, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

Claim 38 (original): The vertical cavity surface emitting laser of claim 31, wherein the substrate is n-doped with the element selenium (Se).

Claim 39 (original): The vertical cavity surface emitting laser of claim 31, wherein the doped tunnel junction is n-doped with silicon (Si).

Claim 40 (original): The vertical cavity surface emitting laser of claim 31, wherein the doped tunnel junction is p-doped with CBr4.

Claim 41 (original): The vertical cavity surface emitting laser of claim 31, wherein the VCSEL operates in the approximate range from between 1.3 microns and 1.6 microns.

Claim 42 (original): The vertical cavity surface emitting laser of claim 31, wherein the pair of mirror portions include a first mirror portion positioned on a top of the active region and a second mirror portion positioned below the active region.

Claim 43 (currently amended): A distributed Bragg reflector for use in a vertical cavity surface emitting laser, comprising a group of layers of semiconductor material doped ~~to reduce voltage drop and optical loss~~ to increase thermal conductivity in a vertical cavity surface emitting laser, the group of layers further including alternating layers of an InP compound approximately lattice-matched to layers comprising $Al_aGa_{1-a}As_bSb_{1-b}$, where "a" and "b" indicate relative proportions of atoms.~~wherein in the group of layers there are alternating layers of an InP compound and layers of an antimonide (Sb) compound, and wherein the group of layers are substantially lattice matched to an InP substrate.~~

Claim 44 (original): The distributed Bragg reflector according to claim 43, wherein the element Sb and the compound InP are included in alternating layers.

Claim 45 (original): The vertical cavity surface emitting laser according to claim 17, wherein the element Sb and the compound InP are included in alternating layers.

Claim 46 (original): The vertical cavity surface emitting laser according to claim 31, wherein the element Sb and the compound InP are included in alternating layers.